This report is required by law (7 USC 21 43) Failure to report according to the regulations can result in an order to cease and desist and to be subject to penalties as provided for in Section 2150.

See reverse side for additional information.

Interagency Report Control No 0180-DOA-AN

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

ANNUAL REPORT OF RESEARCH FACILITY

(TYPE OR PRINT)

1. CERTIFICATE NO: 74-R-0108

CUSTOMER NO: 1480

FORM APPROVED
OMB NO. 0579-0036

2. HEADQUARTERS RESEARCH FACILITY *(Name and Address, as registered with USDA, Include Zip Code)*

TEXAS TECH UNIVERSITY
ACS Box 43132
LUBBOCK, TX 79409
(806) 742-3722 ext. 286

3. REPORTING FACILITY (List all locations where animals were housed or used in actual research, testing, teaching, or experimentation, or held for these purposes. Attach additional Sheets if necessary.)

FACILITY LOCATIONS *(sites)*

See Attached Listing

REPORT OF ANIMALS USED BY OR UNDER CONTROL OF RESEARCH FACILITY *(Attach additional sheets if necessary of use APHIS FORM 7023A)*

A. Animals Covered By The Animal Welfare Regulations	B. Number of animals being bred, conditioned, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes.	C. Number of animals upon which teaching, research, experiments, or tests were conducted involving no pain, distress, or use of pain-relieving drugs.	D. Number of animals upon which experiments, teaching, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which appropriate anesthetic, analgesic, or tranquilizing drugs were used.	E. Number of animals upon which teaching, experiments, research, surgery or tests were conducted involving accompanying pain or distress to the animals and for which the use of appropriate anesthetic, analgesic, or tranquilizing drugs would have adversely affected the procedures, results, or interpretation of the teaching, research, experiments, surgery, or tests. *(An explanation of the procedures producing pain or distress in these animals and the reasons such drugs were not used must be attached to this report)*	F. TOTAL NO. OF ANIMALS (Cols. C + D + E)
4. Dogs					
5. Cats					
6. Guinea Pigs					
7. Hamsters					
8. Rabbits		62	4		66
9. Non-Human Primates					
10. Sheep					
11. Pigs		54	16		70
12. Other Farm Animals					
13. Other Animals					
Deer Mice	107	478			585
Wild Mice	1,815	354			2,169
Voles		100			100

ASSURANCE STATEMENTS

1) Professionally acceptable standards governing the care, treatment, and use of animals, including appropriate use of anesthetic, analgesic, and tranquilizing drugs, prior to, during And following actual research, teaching, testing, surgery, or experimentation were followed by this research facility.

2) Each principal investigator has considered alternatives to painful procedures.

3) This facility is adhering to the standards and regulations under the Act, and it has required that exceptions to the standards and regulations be specified and explained by the Principal investigator and approved by the institutional Animal Care and Use Committee (IACUC). **A summary of all the exceptions is attached to this annual report.** In Addition to identifying the IACUC-approved exceptions, this summary includes a brief explanation of the exceptions, as well as the species and number of animals affected.

4) The attending veterinarian for this research facility has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other Aspects of animal care and use.

NOV 19 2007

CERTIFICATION BY HEADQUARTERS RESEARCH FACILITY OFFICIAL
(Chief Executive Officer of Legally Responsible Institutional official)
I certify that the above is true, correct, and complete (7 U.S.C. Section 2143)

(b)(6), (b)(7)c

DATE SIGNED
11-16-2007

A

ART 1 – HEADQUARTERS

(AUG 91)

This report is required by law (7 USC 21 43) Failure to report according to the regulations can result in an order to cease and desist and to be subject to penalties as provided for in Section 2150.

See reverse side for additional information.

Interagency Report Control No 0180-DOA-AN

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

CONTINUATION SHEET FOR ANNUAL REPORT OF RESEARCH FACILITY

(TYPE OR PRINT)

1. REGISTRATION NO.
74-R-0108

FORM APPROVED
OMB NO. 0579-0036

2. HEADQUARTERS RESEARCH FACILITY *(Name and Address, as registered with USDA, Include Zip Code)*

TEXAS TECH UNIVERSITY
ACS Box 43132
LUBBOCK, TX 79409
(806) 742-3722 ext 286

REPORT OF ANIMALS USED BY OR UNDER CONTROL OF RESEARCH FACILITY (Attach additional sheets if necessary or use this form.)

A. Animals Covered By The Animal Welfare Regulations — 12. &/OR 13. Other (List by species)	B. Number of animals being bred, conditioned, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes.	C. Number of animals upon which teaching, research, experiments, or tests were conducted involving no pain, distress, or use of pain-relieving drugs.	D. Number of animals upon which experiments, teaching, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which appropriate anesthetic, analgesic, or tranquilizing drugs were used.	E. Number of animals upon which teaching, experiments, research, surgery or tests were conducted involving accompanying pain or distress to the animals and for which the use of appropriate anesthetic, analgesic, or tranquilizing drugs would have adversely affected the procedures, results, or interpretation of the teaching, research, experiments, surgery, or tests. *(An explanation of the procedures producing pain or distress in these animals and the reasons such drugs were not used must be attached to this report)*	F. TOTAL NO. OF ANIMALS (Cols. C + D + E)
Armadillo					
Bats		3,968	237		4,205
Coyotes			5		5
Fox		40			40
Gophers			2		2
Squirrel					
Opossum		80			80
Prairie Dogs		15			15
Raccoons			2		2
Wild Rats		331	52		383
Shrews			1		1
Weasels			1		1
Anteaters		1			1
Birds				363	363
Fish				100	100
Frogs/Toads				3,335	3,335

ASSURANCE STATEMENTS

1) Professionally acceptable standards governing the care, treatment, and use of animals, including appropriate use of anesthetic, analgesic, and tranquilizing drugs, prior to, during, And following actual research, teaching, testing, surgery, or experimentation were followed by this research facility.

2) Each principal investigator has considered alternatives to painful procedures.

3) This facility is adhering to the standards and regulations under the Act, and it has required that exceptions to the standards and regulations be specified and explained by the Principal investigator and approved by the institutional Animal Care and Use Committee (IACUC). **A summary of all the exceptions is attached to this annual report.** In Addition to identifying the IACUC-approved exceptions, this summary includes a brief explanation of the exceptions, as well as the species and number of animals affected.

NOV 19 2007

4) The attending veterinarian for this research facility has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other Aspects of animal care and use.

CERTIFICATION BY HEADQUARTERS RESEARCH FACILITY OFFICIAL
(Chief Executive Officer of Legally Responsible Institutional official)

I certify that the above is true, correct, and complete (7 U.S.C. Section 2143)

t)

(b)(6), (b)(7)c

DATE SIGNED
11/16/2007

APHIS FORM 7023A
(AUG 91)

(Replaces VS FORM 18-23 (Oct 88), which is obsolete)

PART 1 – HEADQUARTERS

Column E Explanation
2007 Texas Tech University

1. Registration Number: **74-R-0108**

2. Number 640 animals

3. Species (common name) African Clawed Frog

4. Explain the procedure producing pain and/or distress.

Waterways contain pollutants that have effects on wildlife. This project involves the use of nanoparticles found in effluent that may induce a potentially toxic effect. The nanoparticles were added to the water. Elements encountered at the nanoscale behave differently from their larger counterparts because they easily cross the skin, lung, blood/brain barriers and once inside the body undergo further biochemical reactions creating free radicals that damage cells. Though the body has built-in defenses for natural particles, nanotechnology introduces entirely new types of particles which are toxic to the body. The particles used for this study will include ferric oxide, zinc oxide, cupric oxide and titanium dioxide (anatase form). These were chosen because of their toxicity. Preliminary toxicity tests with so-called "inert'" TiO_2 nanoparticles using Daphnia (water fleas) have found LC 50 (lethal concentrations having 50% chance of causing death) levels as low as 4 mg/L.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

The rationale is that once the toxicological endpoints have been determined, this information can be used to determine the degree to which these materials pose an ecological hazard, to formulate regulatory benchmark concentrations for effluents and receiving waters, and to calculate probabilistic risk assessments for populations of amphibians. This research is innovative, because to date, there have been no studies addressing toxic effects of metal oxide nanoparticles on aquatic vertebrates.

Humane Endpoints

Tanks were inspected three times daily for dead, deformed, or stressed animals. Dead animals will be removed and animals showing signs of stress (whirling, lethargy, gasping, loss of righting reflex, erratic swimming, disorientation) or disease will be removed and euthanized in MS222. Such larva will be regarded as "dead" because these symptoms typically precede death. Uneaten food will be removed daily using a pipette.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

The USEPA requires these tests for ecological risk assessment. Amphibians are one class of organism that reduce uncertainty of risk assessments that are described in Federal Register

Agency USEPA

CFR 63(93):26846-26924 as reproduced in EPA/630/R-95/002Fon p.1 and p. 107.

NOV 19 2007

Column E Explanation
2007 Texas Tech University

1. Registration Number: 74-R-0108

2. Number 55

3. Species (common name) Northern Bobwhite quail

4. Explain the procedure producing pain and/or distress.

   This study developed a muscular exertion model as a model of capture myopathy in quail. Quail were stimulated to exercise by the investigator inserting his arm into the cage every 20 seconds for various periods of time.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

   The purpose of this research is to document that pain or distress actually occurs. Most biologists believe that this regularly used capture method (funnel trap and birds hand-caught from the traps) that is used in the field causes no pain or distress. We are trying to document if any capture myopathy is occurring. Other studies show that use of pain relieving drugs in free ranging animals caught with net-guns may reduce symptoms. That is the next step in these series of tests. But the first step is to document the occurrence of any damage. Use of pain relieving drugs could mask the problem and allow for the incorrect conclusion that this capture technique does not cause any problems.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

None.

Agency _____ CFR _____

Column E Explanation
2007 Texas Tech University

1. Registration Number: 74-R-0108

2. Number 100 Fish

3. Species (common name) Red snapper

4. Explain the procedure producing pain and/or distress.

   This study examined the effects of rapid decompression on fish behavior and survival. The decompression experience is a model for fish caught at depth in the ocean and brought to the surface during normal fishing activities, during which they experience rapid decompression (which is assumed to be stressful) before they are discarded at sea due to size regulations. In our procedure, fish are placed in a hyperbaric chamber to simulate the rapid decompression they experience during standard recreational and commercial fishing activities. Physiological and behavioral responses before and after decompression are recorded and blood is drawn to measure stress responses.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

   Management of fishery resources requires that fish behavior after decompression relative to normal activities such as prey capture and predator avoidance be understood to get a measure of survival after decompression and discarding due to regulations. The relative stress that fish experience by being decompressed from different depths (different levels of pressure) was examined. The end-point was measurement of a blood stress hormone and anatomical and behavioral signs of stress. Use of analgesics after decompression in the field would result in fish being more likely to be predated upon, thus making pain relief deadly for the fish. Also, it is uncertain which methods of pain or distress relief might be effective for this model. Use of analgesics after decompression in the lab would alter fish behavior, negating any results found in the experiment.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

None.

Agency _____ CFR _____

Column E Explanation
2007 Texas Tech University

1. Registration Number: **74-R-0108**

2. Number 58 birds

3. Species (common name) 26 Mallard Ducks
32 House Finches

4. Explain the procedure producing pain and/or distress.

This study examined avian consumption and use of contaminated water resources including toxicological assessment of exposure effects and susceptibility. Ducks and finches are wild birds that consume waters from mines and other sites that may contain toxic substances. Target bird species were exposed to contaminated acid water collected in the field and the potentially toxicological effects of these test waters were determined.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

Birds have died in large numbers associated with mining and other industrial complexes, particularly around acid metalliferous waters. The toxicity of test waters containing complex mixtures of acids and minerals has not been studied. This research determined the effects of acid metalliferous water (AMW) and the potential role of clean recovery water on bird health. Intervention strategy (precipitation of metals with liming) was tested to determine if such strategies eliminate the effects AMW. The goal of a final component was to understand toxic effects of AMW and then to determine if subsequent fresh water availability would alleviate the AMW effects.

Birds are examined every 15 minutes for the 4 hours of dosing period and then every half hour during the second 4 hour period and then every hour during daylight hours. Birds were weighed at 0, 24, and 48 hours and they were euthanized at 48 hours after water exposure.

Humane endpoints for euthanasia if birds that consumed the acid metalliferous water were developed with the Texas Tech University veterinarian. Birds were determined to be in moribund condition *(in extremis)* by visual signs of wing droop, immobility, lack of response to touch/visual/auditory stimuli, and/or inability to hold head erect. All treatment ducks were observed until they were *in extremis*, weighed, and euthanized via carbon dioxide asphyxiation. House finches did not drink the water, thus endpoints were not developed.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

None.

Agency _____ CFR _____

Column E Explanation
2007 Texas Tech University

1. Registration Number: 74-R-0108

2. Number 1,995

3. Species (common name) NM plains Spadefoot toads

4. Explain the procedure producing pain and/or distress.

   This study examined the impacts of herbicides on amphibians on the Southern High Plains. Larvae were exposed to pesticides in tanks containing varying concentrations of herbicide for 48 hours. Juvenile toads were exposed to herbicide formulations via spray as would occur in natural settings where herbicides are applied to fields. These studies were conducted with multiple dose levels to generate dose-response relationships.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

   The purpose of this research is to determine the toxicity of specific herbicides to larval and juvenile amphibians. Use of anesthetics or other agents to reduce pain or distress would confound results making data unusable for their intended purpose – ecological risk assessments.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

None.

Agency _____ CFR _____

Column E Explanation
2007 Texas Tech University

1. Registration Number: 74-R-0108

2. Number 700

3. Species (common name) Bull Frogs

4. Explain the procedure producing pain and/or distress.

   This study examined the effects of 2,6 trinitrotolune (TNT) metabolites on frog larvae (not counted here) and adult frogs. Frogs were exposed to TNT metabolites and toxicity was measured by 96-hour survival, growth, and developmental abnormalities.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

Military and industrial sites may generate TNT metabolites which may have effects on wildlife including frogs. The compounds 2-amino-4,6-dinitrotoluene (2A-DNT) and 4-amino-2,6-nitrotoulene (4A-DNT) are the primary reduction products of 2,4,6-trinitrotoluene (TNT). 2A-DNT is a microbial degradation product of the military explosive, trinitrotoluene (TNT). It has been shown to be present at sites within and around army munitions factories and during load, assembly and pack activities at military installations. Toxicity data for 2A-DNT and 4A-DNT are gravely lacking in amphibian species and can only be obtained by directly testing in the selected species at environmentally relevant concentrations.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

None.

Agency _____ CFR _____

Column E Explanation
2007 Texas Tech University

1. Registration Number: 74-R-0108

2. Number 250

3. Species (common name) Northern Bobwhite quail

4. Explain the procedure producing pain and/or distress.

   Quail will be administered polycyclic aromatic hydrocarbons (PAHs) to determine acute, sub-acute, and chronic toxicity values. Quail will be orally gavaged with PAHs mixed with corn oil or other carrier.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see Item 6 below.)

   The purpose of this research is to determine the toxicity of specific PAHs in birds. Use of anesthetics or other agents to reduce pain or distress would confound results making data unusable for their intended purpose – ecological risk assessments.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102):

None.

Agency _____ CFR _____